Capsular warning syndrome: a case report and learning point

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Capsular warning syndrome: a case report and learning point

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ABSTRACT

Background: Capsular Warning Syndrome (CWS) is a rare clinical entity that manifest as multiple stereotypical transient ischemic attacks (TIAs) within 24 hours. This syndrome frequently serves as a precursor to a more severe ischemic stroke. CWS should be considered a crucial warning sign, that emphasize the importance of timely and effective medical intervention.

Case report: We report a case of 64-year-old hypertensive male who experienced several brief episodes of slurred speech and left-sided weakness, each lasting 10-20 seconds, over a 24-hour period. This multiple attack resolves spontaneously with complete recovery. Initial brain CT showed no abnormalities, and he was treated with aspirin and statin. However, despite this treatment, he later developed sudden onset left-sided hemiplegia, along with central facial and hypoglossal nerve palsy. Further MRI revealed a hyperacute infarct in the right internal capsule region. He was then treated with anticoagulant and double anti platelet, resulting in significant neurological recovery.

Conclusion: We report a rare case of CWS. The learning points of this case highlights the ciritcal need for early identification of CWS to ensure timely and appropriate management.

Keywords: acute brain infarct, transient ischemic attacks, capsular warning syndrome

Introduction

The Capsular Warning Syndrome (CWS) is a rare clinical entity. This syndrome was defined as the occurrence of at least three stereotypical episodes of transient ischemic attacks (TIAs) that last in short time frame, usually 24 hours, with complete recovery between episodes and without any cortical symptoms. (1,2) The clinical presentation of CWS often involves either motor or sensory deficits that are transient but recurrent, this is indicating a very high risk of an impending stroke. (2) This pattern of multiple TIAs serves as a crucial warning sign that emphasizing the need for optimal medical intervention to prevent a more severe ischemic event. (3,4) The internal capsule is the most commonly affected region (50%), but ischemia can also occur in the thalamus, midbrain, pons, and striatum. Although various treatments such as thrombolysis, antiplatelet therapy, anticoagulation, and vasopressors have been explored, no standardized approach has been established. (9)

CWS involves transient cerebral ischemia with recurring episodes, often within a short time. It was first described by Donnan et al. as "crescendo transient ischemic attacks," typically affecting the face, arm, and leg without cortical symptoms. In severe cases, three or more episodes occur within 24 hours. While its exact cause remains unclear, common risk factors include hypertension, diabetes, dyslipidemia, and smoking, suggesting atherosclerosis as a potential contributor. Some researchers propose intermittent hemodynamic changes as a mechanism. MRI studies have shown early hypoperfusion followed by infarction due to arterial thrombosis. Despite different treatment approaches being suggested, the optimal management of CWS remains uncertain. (9)

The previous studies showed that the incidence of CWS in patients with recurrent TIAs ranges from 1.5-4.5%, while the risk of progressing to a disabling stroke within seven days can reach as high as 60%. (4) Recent views have highlighted the value of MRI with diffusion-weighted imaging (DWI) in identifying patients at higher risk for further stroke, helping to guide optimal

management strategies. (5) We report a rare case of Capsular Warning Syndrome and highlight key lessons for early identification and more effective management.

Case Report

We report a case of a 64-year-old male with a long-standing history of well-controlled hypertension. He is a non-smoker and has no other significant medical history. His regular medication includes Candesartan 16 mg. He came to the emergency department with complaints of four transient episodes of slurred speech and left side transient motor weakness. Each episode lasted approximately 10-20 seconds and resolved spontaneously without any significant residual symptoms. The patient has no prior history of similar episodes, diabetes, stroke, or heart disease. On neurological examination, his vital signs were stable, and no neurological abnormalities were observed. Initial brain CT scans showed no significant abnormalities, including signs of infarction or hemorrhage. (Figure 1) The patient declined hospitalization and was treated with low dose of aspirin and statin. After being discharged, he experienced three more episodes with similar symptoms, each resolving without any lasting deficits. All the transient episodes occurred within a 24-hour period.

Following all the episodes, the patient suddenly developed left-sided weakness, along with facial deviation and slurred speech. The patient returns to the hospital's emergency department, where further neurological examination revealed left-sided weakness with a muscle strength grade of 1/5 in both the left upper and lower limbs, according to the MRS (Medical Research Council) grading system. The neurological examination also indicated central-type facial and hypoglossal nerve palsy. An urgent brain MRI was performed, which showed a hyperacute infarction in the right internal capsule (Figure 2).

We initiated a loading dose dual anti platelet therapy and anticoagulation for this patient, also replaced the statin with 80 mg of Atorvastatin. Routine blood tests and lipid profile results were normal. The ECG, chest X-ray, and cardiac consultation has no significant findings. The patient showed gradual improvement in motor function over the course of 7 days in the hospital.

The NIHSS Stroke Score decreased from 15 at onset to 6 after 7 days. The patient was discharged with mild disability, as assessed by the modified Rankin Scale.

Additional imaging tests, including a carotid Doppler and echocardiogram were normal. The patient continued dual antiplatelet therapy and a high-intensity statin and was also started on a physical therapy program. Follow-up at three months showed improvement in his modified Rankin Scale (mRS) score, which decreased from 4 at onset to 1, indicating only minimal residual disability.

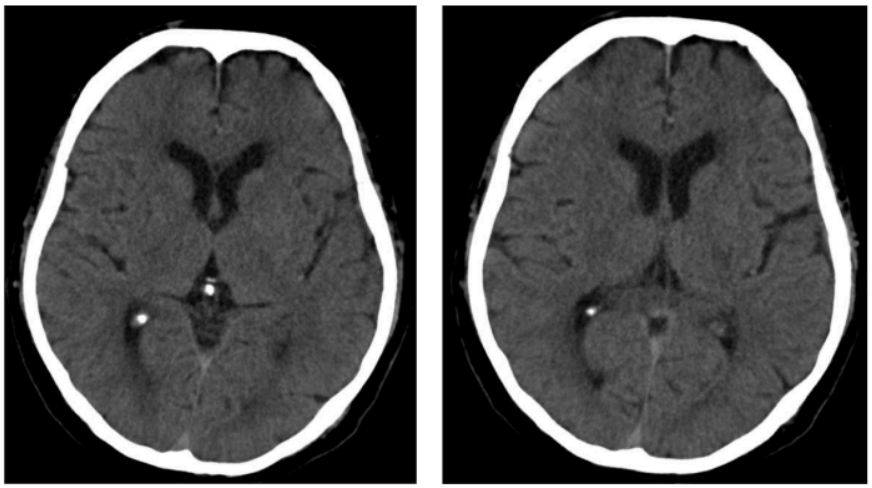

Figure 1. The initial brain CT scan showed no significant abnormality.

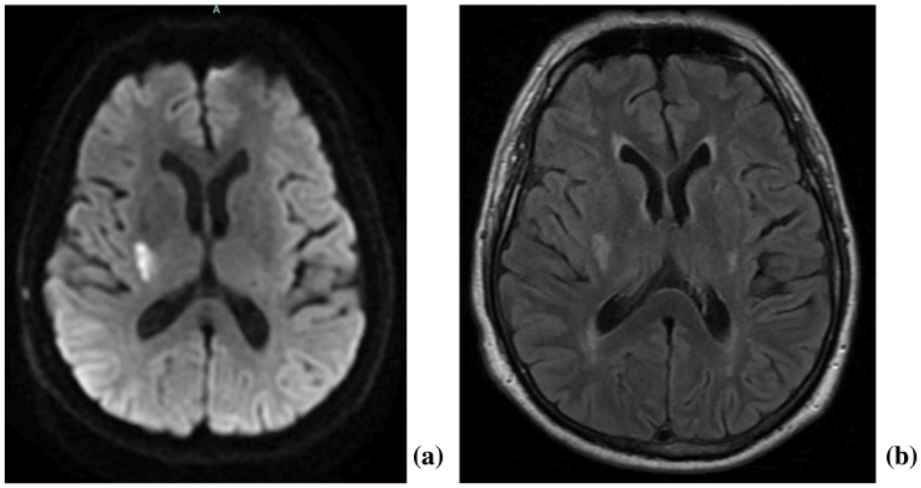

Figure 2. Further brain MRI showed hyperacute infarction in DWI (a) and FLAIR (b).

Discussion

We report a rare case of Capsular Warning Syndrome (CWS). This syndrome was rare and characterized as distinct recurrent, stereotypical episodes of transient ischemic attacks (TIAs) that primarily involve motor or sensory deficits. (2,3) These recurrent episodes, which usually affect limbs, occur over a transient period. (2,) This condition is attributed to transient ischemia in the small penetrating arteries supplying especially the internal capsule. Previous reviews have noted that CWS often precedes a more disabling lacunar stroke, that makes the term "Capsular Warning Syndrome". (1,2)

Previous studies showed that the neurological deficits that associated with CWS typically involve pure motor or sensorimotor deficits, which tend to resolve spontaneously, as seen in our patient. Advanced neuroimaging, particularly MRI with diffusion-weighted imaging (DWI), plays crucial role in detecting small, hyperacute ischemic lesions that may not be visible on standard brain CT scans. The use of DWI could identify early ischemic changes in the internal capsule, even when conventional imaging appears normal. This approach aids in the early diagnosis of CWS and supports the implementation of appropriate management strategies. (6,7) Neuroimaging plays a

crucial role in the diagnosis and pathophysiological understanding of Capsular Warning Syndrome (CWS). A previous study demonstrated that all patients underwent an initial computed tomography (CT) scan; however, acute ischemic infarctions were detected in only 9.5% of cases. In contrast, magnetic resonance imaging (MRI) identified ischemic infarcts in 71.2% of cases, demonstrating its superior sensitivity in detecting early-stage infarcts. The internal capsule was the most frequently affected region (50%); however, infarcts were also observed in the pons (16.7%), striatum (16.7%), thalamus (6.7%), midbrain (3.3%), corona radiata (3.3%), and cerebellum (3.3%). Notably, 81.3% of ischemic lesions were classified as lacunar infarcts. Furthermore, the study investigated the etiology of CWS based on the TOAST classification, revealing that small vessel disease was the predominant cause (73.8%), followed by large artery atherosclerosis (11.9%) and cardioembolic events (9.5%). A small proportion of cases remained of unknown origin. Additionally, some patients exhibited significant arterial stenosis in the carotid or basilar arteries, suggesting a potential role of hemodynamic instability or artery-to-artery embolism in the pathogenesis of CWS. These findings underscore the importance of MRI in detecting ischemic infarcts that may not be visible on CT scans and highlight small vessel disease as the primary etiological factor in CWS. However, the contribution of large artery disease and cardioembolic sources should also be considered in the clinical evaluation and management of these patients. (5)

Proper management of Capsular Warning Syndrome is crucial to prevent progression to a more disabling stroke. (4,6) The urgent medical intervention typically includes the use of optimal antiplatelet agents, such as aspirin, clopidogrel or combination, to reduce the risk of further formation of thrombi in the small penetrating arteries. (7,8) In cases where a stroke does occur, optimal antithrombotic therapy, statin, and supportive treatments that encompass strict control of blood pressure, blood glucose optimization in diabetic patients, and appropriate lipid management which are necessary to address underlying stroke risk factors. (7) Aggressive and appropriate management is key to stabilizing the patient and preventing further ischemic attacks. (8) Managing Capsular Warning Syndrome (CWS) remains a challenge due to the lack of a standardized treatment protocol. Various treatment options have been explored, including thrombolysis,

antiplatelet therapy, anticoagulation, and vasopressor administration. Nearly 28.6% of patients in the study underwent intravenous thrombolysis with recombinant tissue plasminogen activator (rtPA). While some patients achieved full recovery, others continued experiencing recurrent symptoms. Importantly, no bleeding complications were observed, indicating that thrombolysis is relatively safe. However, its effectiveness in significantly improving outcomes is still debated, as some studies show benefits while others do not. For patients who did not receive thrombolysis, alternative treatments included single or dual antiplatelet therapy (DAPT), anticoagulants, and combinations of antiplatelet and vasopressor therapy. Antiplatelet therapy was the most frequently administered, though its superiority over other strategies in preventing infarction is still unclear. Vasopressors have historically been used to manage CWS, based on theories that hemodynamic factors contribute to its onset. However, the effectiveness of vasopressors remains uncertain, as the precise underlying mechanisms of CWS are not fully understood. (5)

The prognosis in this Capsular Warning Syndrome (CWS) was vary. A study reported that 92.9% of patients had a good prognosis within three months, with only 2.4% experiencing stroke recurrence. Despite the various treatment options available, no single approach has been definitively proven as the most effective. Further research is required to establish the best management strategy for CWS. (5) In our case, the patient received prompt treatment and was discharged with minimal disability. We describe a case where dual antiplatelet and anticoagulation therapy was used for Capsular Warning Syndrome. Despite treatment with aspirin and statin, our patient developed an ischemic stroke. However, with more appropriate management and advanced imaging, significant improvement in weakness was achieved.

Conclusion

Our case emphasizes the critical importance of recognizing Capsular Warning Syndrome (CWS) as a key neurological sign that may precede a severe ischemic stroke. CWS can progress to a more disabling ischemic stroke, presenting significant challenges for treatment.

Patient consent:

We hereby certify that we have obtained verbal informed consent from the patient. Every effort has been made to ensure the patient's anonymity, and any identifiable information, including personal details, has been removed or anonymized to prevent identification.

Conflict of interest:

No conflict of interest

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